**Small Business Innovation Research/Small Business Tech Transfer**

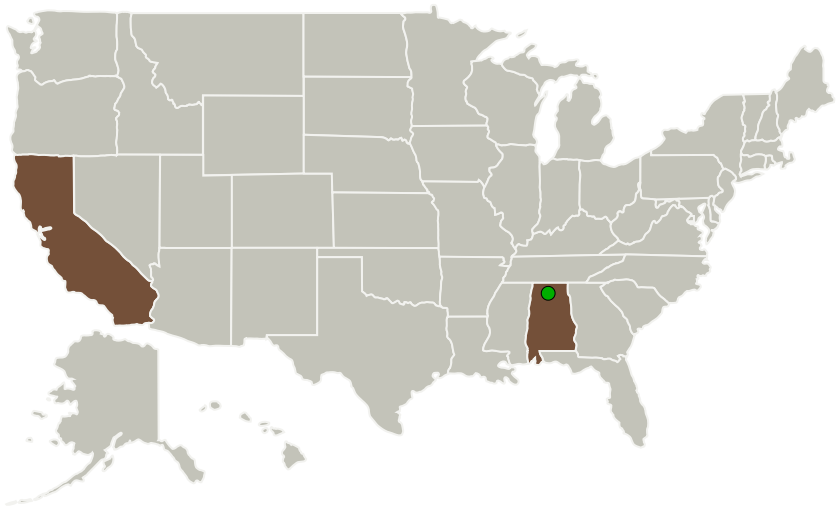
# Diffusion Bonded CVC SiC for Large UVOIR Telescope Mirrors and Structures, Phase I

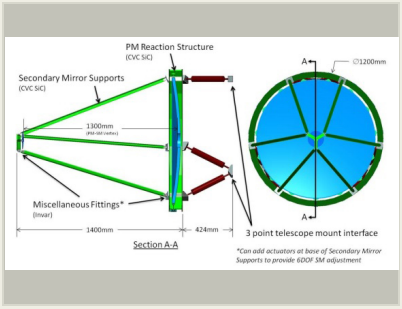
Completed Technology Project (2015 - 2015)

## Project Introduction

Trex proposes to demonstrate a novel ceramic joining technology (solid state bonding) for CVC SiC® that allows "seamless" joining of smaller, easily manufactured, and simply shaped components to produce large mirrors and telescope structures, a type of Additive Manufacturing. Trex CVC SiC® is a directly super-polishable mirror substrate material that does not require a silicon cladding, and it has tremendous thermal diffusivity for passive dimensional stability. Such an Additive Manufacturing process minimizes schedule intensive machining processes, labor hours, polishing time, and metrology, which in turn dramatically decreases the cost of the mirror. Our Phase I objective is to optimize the solid state bonding process (make it 100% pore free) and to fabricate a subscale monolithic mirror substrate from hexagonal panels which have been solid state bonded together. Phase I will demonstrate traceability to multi-meter class mirror substrates. Trex CVC SiC® represents an extraordinary technology investment opportunity for NASA with respect to near-term balloon-borne stratospheric telescopes for Astrophysics and Planetary science, and farther term EUOVIR telescopes such as ATLAST observatory.

## Primary U.S. Work Locations and Key Partners



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| Organizations Performing Work | Role | Type | Location |
|---|---|---|---|
| Trex Enterprises Corporation | Lead Organization | Industry | San Diego, California |
| Marshall Space Flight Center(MSFC) | Supporting Organization | NASA Center | Huntsville, Alabama |

| Primary U.S. Work Locations | |
|---|---|
| Alabama | California |

## Project Transitions

**June 2015:** Project Start

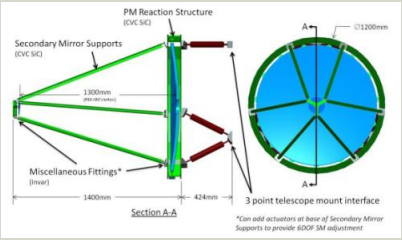
**December 2015:** Closed out

**Closeout Summary:** Diffusion Bonded CVC SiC for Large UVOIR Telescope Mirrors and Structures, Phase I Project Image

**Closeout Documentation:**

- Final Summary Chart Image*(https://techport.nasa.gov/file/138937)*

## Images




**Briefing Chart Image**
Diffusion Bonded CVC SiC for Large UVOIR Telescope Mirrors and Structures, Phase I
*(https://techport.nasa.gov/image/127584)*

## Organizational Responsibility

**Responsible Mission Directorate:**
Space Technology Mission Directorate (STMD)

**Lead Organization:**
Trex Enterprises Corporation

**Responsible Program:**
Small Business Innovation Research/Small Business Tech Transfer

## Project Management

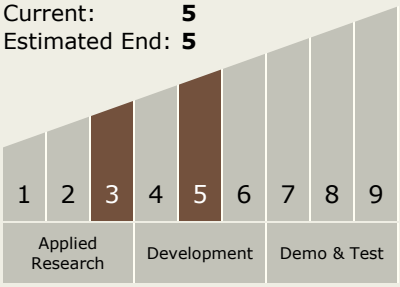
**Program Director:**
Jason L Kessler

**Program Manager:**
Carlos Torrez

**Principal Investigator:**
Lauren Bolton

## Technology Maturity (TRL)

Start: **3**
Current: **5**
Estimated End: **5**



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## Technology Areas

**Primary:**

- TX08 Sensors and Instruments
  - TX08.2 Observatories
    - TX08.2.1 Mirror Systems

## Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System